

RULES AND REGULATIONS PERTAINING TO  
TESTING OF NEWBORN INFANTS

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**SECTION I. PURPOSE.**

The purpose of this regulation is to assure that all infants born in Arkansas have the opportunity to be screened for genetic metabolic illnesses. Screening shall include:

A. Phenylketonuria (PKU), Congenital Hypothyroidism (CH) and Galactosemia are conditions (diseases) which cause irreversible brain damage and mental retardation unless they are detected and treated at a very early stage in the life of a newborn individual. Untreated Galactosemia also results in liver disease, cataracts, and increased susceptibility to serious infection. Early diagnosis and treatment are absolutely essential in order to avoid these health problems.

B. Sickle Cell Disease (SS) is the most common inherited abnormality of a red blood cell protein called hemoglobin. It is caused by a genetic abnormality that must be inherited from both parents. Sickle Cell Disease may cause serious health problems even in the first few months of life. It occurs much more commonly in people of African American, Asian and Mediterranean descent. In addition to the anemia, it lowers resistance to infection, and is associated with increased morbidity and mortality unless diagnosed and treated early. Sickle Cell Disease is one of a handful of related hemoglobinopathies each of which can cause similar health problems with varying severity.

C. Sickle Cell Trait (AS) and other hemoglobinopathy traits differ from their corresponding diseases. Traits occur when the genetic abnormality is inherited from only one parent, the other parent contributing a normal gene. Hemoglobinopathy traits cause only minor health issues that show up occasionally in life. They are associated with normal life spans. Sickle Cell Trait (AS) is the most common, occurring in 8 to 10% of African Americans.

D. Biotinidase Deficiency (BIOT) is caused by the lack of an enzyme called biotinidase, resulting in an inability of the body to use vitamin B substances absorbed by the intestines. Without sufficient biotin, several other critical enzyme systems are unable to function properly. Biotinidase deficiency can lead to seizures, developmental delay, skin rash, and hearing loss. Newborns with the disorder appear normal, but develop critical symptoms after the first weeks or months of life. Symptoms include floppiness, seizures, developmental delay, hair loss, rashes, hearing loss and vision loss. Metabolic acidosis can result in coma and death. A daily biotin dietary supplement can prevent all symptoms.

E. Congenital Adrenal Hyperplasia (CAH) is a group of disorders caused by the deficiency of an adrenal enzyme resulting in decreased production of important hormones called cortisol and aldosterone. Cortisol helps the body respond to stressful events. Aldosterone helps the body maintain its fluids and salts. Without enough of these hormones, the affected newborn may appear normal, but can quickly develop symptoms including lethargy, vomiting, muscle weakness and dehydration. In severe cases death may occur within a few weeks if left untreated. One kind of CAH may show up first as ambiguous genitalia in the newborn. Infants with milder forms of the disorder are still at risk for reproductive and growth difficulties. If detected early and maintained on appropriate doses of medication, infants diagnosed with CAH can have normal growth and development.

F. Cystic Fibrosis (CF) is a disorder in which the body cannot make an important protein involved in using chloride ions, an ingredient in table salt. The major clinical consequences are the production of abnormally thickened mucous secretions in the lungs and digestive systems of affected newborns. With early detection and lifelong comprehensive treatment plans, infants diagnosed with CF can be expected to live longer and in a better state of health than in the past.

G. Amino Acid Disorders make up a group of inherited conditions in which protein metabolism is disrupted. Onset of symptoms may occur shortly after birth or after an apparently normal neonatal period. The symptoms may occur in episodes with normal periods in between. The clinical onset may include unusual odors in the urine, irritability, poor feeding, changes in muscle tone, lightened pigmentation, failure to thrive, jaundice, or liver enlargement. Other symptoms include intoxication-like symptoms such as vomiting, lethargy, seizures, and coma. Treatment of amino acid metabolism disorders includes a low-protein diet strictly controlling intake of specific amino acids.

H. Fatty Acid Oxidation Disorders make up a group of genetic metabolic deficiencies in which the body is unable to oxidize (break down) fatty acids to make energy. An enzyme is either missing or not working correctly. The main source of energy for the body is a sugar called glucose. Normally when the glucose runs out, fat is broken down into energy. However, that energy is not readily available to children and adults with a fatty acid oxidation disorder. If undiagnosed and untreated, these disorders can lead to serious complications affecting the liver, heart, and eyes; general muscle development; and possibly death. Symptoms of a metabolic “crisis” include vomiting, diarrhea, lethargy and difficulty breathing.

I. Organic Acid Disorders make up a group of inherited metabolic diseases that lead to accumulation of organic acids in biological fluids (e.g., blood and urine). The accumulation produces disturbances in the acidity of the body and causes alterations in metabolic chemical reactions. These disorders can cause intoxication-like symptoms such as vomiting, metabolic acidosis, ketosis, dehydration, or coma. Some patients may have too little sugar in the blood, or too much lactic acid or ammonia. Chronic symptoms include recurrent vomiting, failure to thrive, floppiness and general developmental delay. Symptoms of these disorders can be diminished by restricting protein in the diet and, in some cases, supplementation with vitamins or a nutrient called carnitine.

J. These Rules and Regulations provide a method to assure that:

1. All newborn infants are tested for Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Galactosemia, Sickle Cell Disease (SS), Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, and Organic Acid Disorders, and
2. All newborns with an abnormal screen receive appropriate medical follow-up.

## **SECTION II. AUTHORITY.**

These Rules and Regulations are promulgated pursuant to the authority conferred by Arkansas Code Annotated § 20-15-301, et seq.

## **SECTION III. RESPONSIBILITY.**

A. Collection and Submission.

1. Medical Facilities/Medical Staff: In all cases where the birth of an infant occurs in a medical facility licensed by the Board of Health, it shall be the responsibility of the governing body and medical staff of the facility to adopt and enforce policies and procedures which ensure that blood tests for Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Galactosemia, Sickle Cell Disease (SS), Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, and Organic Acid Disorders are conducted and processed in accordance with these rules and regulations. The licensed facility shall also be responsible for submission of the usable blood specimen in cases where an infant less than six months of age is admitted (i.e., born out of hospital, neonatal transfer, etc.), and it is brought to the attention of the facility or the attending physician that the infant is untested. If an infant is discharged from a licensed medical facility without collection and submission of a usable specimen for testing, it shall be the responsibility of the discharging facility and the attending physician to arrange for the testing. The discharging facility and attending physician shall notify the Arkansas Department of Health ("Department") within one week of discharge if their efforts fail to arrange for testing.

2. Physicians: Physicians assuming care of infants who are under six months of age and who come to their attention as being untested or inadequately tested for Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Galactosemia, Sickle Cell Disease (SS), Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, and Organic Acid Disorders shall also be responsible for assuring collection and submission of usable blood specimens for these infants.

3. Licensed Midwives: In cases where the birth occurs outside a licensed medical facility or in the home, it shall be the responsibility of an attending licensed midwife to advise the parents of this law and the procedure for conducting newborn screening, and documenting that a blood sample is obtained after 24 hours and no later than 72 hours after birth. Required forms are available from the Local Health Unit. If the blood sample is not obtained for any reason, an attending licensed midwife must document the incident in the patient's chart.

4. Department: The Department's Local Health Units shall collect and submit usable blood specimens on all infants under six months of age who come to their attention as being untested or inadequately tested. This responsibility shall not be in lieu of that of the preceding individuals and facilities.

B. Payment

1. The submitter will be charged a fee for the processing of newborn screening specimens by the Department.

2. The Board of Health may determine the amount of this fee based on the Department's cost to process the specimens.

C. Laboratory Analysis

1. The Department shall be responsible for: provision of forms and instructions for the blood specimen collection; processing and recording of the specimen received; analysis of specimen; determination of abnormal results; and reporting of lab results within a time period which would allow preventive medical intervention.

D. Follow-Up

1. The Department shall be responsible for the interpretation of laboratory results and the reporting of abnormal results to the attending physician or birth attendant. If the screening result is suggestive of Classical or Variant PKU, Galactosemia, Sickle Cell Disease (SS), Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders, the Department shall consult with specialist physicians who are retained by contract to provide clinical advice on these conditions. The Department shall notify the submitter of the specimen and enter the infant's information in a tracking system maintained to evaluate program operations and infants' medical outcomes.

2. Attending Physician/Medical Attendant:

- a) Upon receipt of notice of an abnormal test result for Galactosemia, the physician or medical attendant shall be responsible for the appropriate medical treatment, referral, and/or retesting within two (2) days of notification. It is strongly recommended that a geneticist be consulted.
- b) Upon receipt of a notice of an abnormal test result for Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis CF, Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders the physician or medical attendant shall be responsible for the appropriate medical treatment, referral, and/or retesting within seven (7) days of notification. It is strongly recommended that consultation be obtained with a physician who has special competence in the management of these disorders.
- c) Upon receipt of notice of an abnormal test for Sickle Cell Disease (SS), Sickle Cell Trait (AS) or other hemoglobinopathy, the physician or medical attendant shall be responsible for the appropriate retesting, medical treatment, and/or referral. For conditions other than hemoglobinopathy traits, it is strongly recommended that consultation be obtained with a physician who has special competence in the management of these disorders.
- d) The attending physician or other responsible health care provider who conducts testing in follow-up to abnormal screens shall report subsequent test results (whether negative or positive) to the Department. To provide for long-term follow-up the Department will collect data on affected infants each year for five years to determine health care maintenance and health status, especially the presence of mental retardation or permanent disability.

E. The ADH will establish protocols for follow-up of all screened disorders in collaboration with medical specialists under contract. For infants with abnormal test results, the physician will be notified of the results and informed of the recommended protocols for follow-up of the specific disorder.

#### **SECTION IV. SPECIMEN COLLECTION AND SUBMISSION**

A. The blood specimen for PKU, CH, Galactosemia, Sickle Cell Anemia, Biotinidase (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders testing must be collected and submitted as described below:

##### **B. Timing of Specimen Collection**

- 1. For all healthy infants born in medical facilities, the specimen shall be collected before the time of discharge from the facility. Optimum time for collection is 24 to 72 hours after birth, and all providers should strive to comply with that time frame. It is especially important that breast or formula feeding has been begun before discharge from the hospital to assure accuracy of testing for PKU and Galactosemia. If any infant is discharged or specimen collected prior to 24 hours of age, a repeat test shall be arranged by the medical facility and the attending physician. This repeat specimen shall be collected by the infant's seventh day of life. A repeat test for Sickle Cell Disease shall not be required if specimen was collected prior to 24 hours of age.

2. Specimens from ill or premature infants shall be obtained as soon as possible after their condition has sufficiently stabilized.

3. Specimens from infants not born in medical facilities shall be collected between the second and seventh day of life.

4. Infants under six months of age who are known to be untested or inadequately tested shall have blood specimens collected and submitted by the responsible authority as soon as possible.

C. Specimen Collection and Submission

1. Specimens shall be submitted to the Arkansas Department of Health Public Health Laboratories, Little Rock, Arkansas, within 48 hours of collection. Specimens are submitted only on forms provided by the Public Health Laboratory. The submitter is responsible for supplying adequate identifying information on the collection/report form to be used for tracking infants with abnormal screening results.

D. Forms

Submission forms may be obtained by writing to the Public Health Laboratories at:

Arkansas Department of Health  
201 South Monroe  
Little Rock, AR 72205

The county health units will not supply these forms.

E. Unusable Specimens

Inadequate, contaminated, or otherwise unusable specimens shall be reported to the submitter after laboratory determination of an unusable specimen. The submitter shall be responsible for assuring recollection and resubmission within seven days of notification.

**SECTION V. ANALYSIS, INTERPRETATION, AND REPORTING OF RESULTS**

A. Laboratory Analysis

1. All specimens received by the laboratory shall be initially examined within five working days of receipt. Abnormal results shall be reported to the submitter within two working days of determination.

B. Interpretation of Results

1. Phenylketonuria (PKU)

a) The Department shall define the phenylalanine level which constitutes a positive screening result for PKU.

b) An infant whose phenylalanine level is determined by the Department to be negative for PKU requires no action to be taken. However, attending physicians shall give special consideration when the testing circumstances or infant evaluation/family history suggests the possibility of need for prescreening in cases where PKU or PKU variants may actually exist in spite of initial negative screening results.

2. Congenital Hypothyroidism (CH)

- a) The Department shall define the thyroxine and thyroid stimulating hormone levels which constitute positive screening results for CH.
  - b) Occasionally test results suggestive of CH may be reported which, upon retesting, will be found within normal limits. Likewise it is possible that test results which are reported as normal in the neonatal period could mask the delayed onset of CH. While an infrequent occurrence, in the face of clinical findings, this possibility must be considered by the attending physician.
- 3. Galactosemia
  - a) The Department shall define the galactose-1-phosphate uridyl transferase (GALT) levels which constitute positive screening results for Galactosemia.
  - b) It is possible that an infant affected with Galactosemia could have normal initial screening results. This situation is most likely to occur in infants who have received no or insufficient feedings with lactose-containing milk or formula prior to testing, or who have received blood transfusions prior to testing.
  - c) The medical caretaker shall give special consideration to retesting any infant whose case findings, testing circumstances, or family history seems to medically warrant it.
- 4. Sickle Cell Anemia or Trait
  - a) The Department shall define the laboratory value which constitutes a positive screening result for Sickle Cell Disease (SS), Sickle Cell Trait (AS) or other related hemoglobinopathy.
  - b) An infant whose hemoglobin is determined by the Department to be negative for SS or other related serious hemoglobinopathies requires no special consultation; however, infants with trait conditions should be followed for mild anemias and urinary tract infections.
  - c) The medical caretaker shall give special consideration to re-testing any infant whose case findings, testing circumstances, or family history seems to medically warrant it.
- 5. Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders
  - a) The Department shall define the laboratory value which constitutes a positive screening result for Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, and Organic Acid Disorders.

## C. Reporting of Results

- 1. Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Galactosemia Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders.

- a) Immediately upon obtaining the initial positive screening result, the Department shall notify the attending physician or medical attendant, who shall be responsible for ensuring that prompt follow-up diagnostic testing is conducted.
  - b) Appropriate, expectant medical management shall not be withheld pending the confirmatory test results. A non-physician submitter shall immediately refer the infant for appropriate medical intervention. It is recommended that a pediatric geneticist, endocrinologist, or pulmonologist consultant be utilized in the management of these infants.
2. Sickle Cell Disease (SS) and other serious Hemoglobinopathies
  - a) Immediately upon obtaining the initial positive screening result, presumptive of SS or other serious hemoglobinopathy, the Department shall notify the submitter, who shall be responsible for insuring that prompt follow-up diagnostic testing is conducted.
  - b) Appropriate, expectant medical management shall not be withheld pending the confirmatory test results for either SS or other related hemoglobinopathy. Therefore, a non-physician submitter shall immediately refer the infant for appropriate medical intervention. It is recommended that a pediatric hematologist consultant be utilized in the management of these infants.
  - c) Immediately upon obtaining an initial positive screening, presumptive of trait, the Department shall notify the submitter in writing. The parent shall be notified in writing by the Department.

## **SECTION VI. ARKANSAS DEPARTMENT OF HEALTH ROLE IN TREATMENT AND MONITORING**

- A. Listing of Consultants
  1. For Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Galactosemia, Sickle Cell Disease and other hemoglobinopathies, Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders, the Department shall maintain a list of pediatric consultants having special competence in these disorders, and shall make the names of such consultants known to the attending physicians of infants with abnormal screening test results.
- B. Registry
  1. For Phenylketonuria (PKU), Congenital Hypothyroidism (CH), Galactosemia, Sickle Cell Disease (SS) and other hemoglobinopathies, Biotinidase Deficiency (BIOT), Congenital Adrenal Hyperplasia (CAH), Cystic Fibrosis (CF), Amino Acid Disorders, Fatty Acid Oxidation Disorders, or Organic Acid Disorders, the Department shall maintain a registry to record laboratory results and diagnoses of all tested infants, and to track referral for those infants in whom abnormal findings were noted during the screening process.
- C. Nutritional Therapy



1. Phenylketonuria (PKU)
  - a) Nutritional therapy with low phenylalanine formula and/or foods shall be instituted after the diagnosis of PKU.
2. Galactosemia
  - a) Nutritional therapy with lactose-free formula and/or foods shall be instituted after the diagnosis of Galactosemia.
3. Other metabolic conditions
  - a) Other metabolic conditions may require nutritional therapy as recommended by specialist consultants.

#### **SECTION VII. SEVERABILITY**

If any provision of these Rules and Regulations, or application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of these Rules and Regulations which give effect without the invalid provisions or applications, and to this end the provisions hereto are declared to be severable.

#### **SECTION VIII. REPEAL**

All Regulations and parts of Regulations in conflict herewith are hereby repealed.

#### **CERTIFICATION**

This will certify the foregoing Rules and Regulations Pertaining to Newborn Screening were adopted by the Arkansas State Board of Health at a regular session of the Board held in Paris, Arkansas on the 1<sup>st</sup> day of November, 2007. The effective date of this rule shall be July 1, 2008. However, the Board may, upon certification by the Department that it has achieved the capability of testing and monitoring these conditions, amend the effective date after 30 days notice to interested parties.

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Paul Halverson, Dr.P.H.  
Secretary, Arkansas State Board of Health

The foregoing Rules and Regulations, copy having been filed in my office, are hereby approved on this \_\_\_\_ day of \_\_\_\_\_, 2007.

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Mike Beebe  
Governor